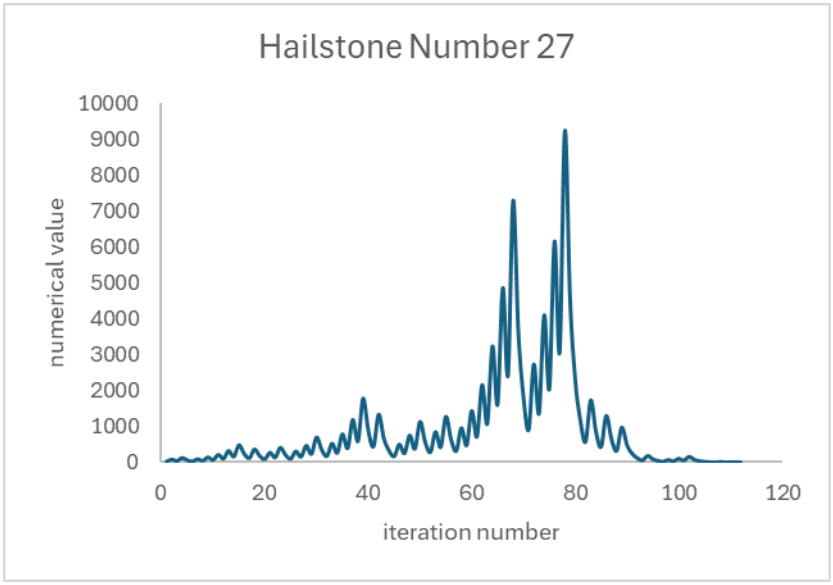
Hailstone Numbers—C.E. Mungan, Summer 2026

Get out your calculators. Start with any positive integer. If it is odd, multiply it by 3 and then add 1. If it is even, divide it by 2. Continue this process for succeeding numbers until you hit the value 1.

First try starting with 1. What happens?

Now try other integers. Your goal is to find the longest sequence of integers that you can until you hit 1. (A long sequence will also be one that contains a large peak value among the integers somewhere around two-thirds of its length.)

A special number is 27. Try it:



To generate the numerical values plotted in this graph in Excel, type "27" into cell A1, type "=IF(A1/2=INT(A1/2),A1/2,A1*3+1)" into cell A2, and then click and drag cell A2 downward to cell A112.

It hits a maximum value of 9232 and has a sequence length of 112 steps! It is called a hailstone number because this graph resembles that of a hailstone being carried upward by successive updrafts until it grows really big. Only a few integers behave this way; most crash down to 1 much more rapidly.

The Collatz conjecture states that if you start with *any* positive integer, this sequence will eventually end with the infinitely repeating loop 1-4-2-1 (which is as good as saying that it ends with the first 1 reached). However, no proof of this conjecture exists and it is thus a famous unsolved problem in number theory.